PATENT SPECIFICATION

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475,327
No. 12154/37

COMPLETE SPECIFICATION

Improvements in or relating to High Pressure Taps and Valves

I, LOUIS JEAN MOÏSE CAPEL, a citizen of the French Republic, of 18, rue d'Alsace, Toulouse, Haute-Garonne, France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Whenever it is a question of storing and distributing a highly compressed fluid, somewhat serious difficulties always arise from the tap or valve member employed.

Numerous and very ingenious systems have been provided for obviating this difficulty, but generally speaking none of them has really satisfied the requirements because some comprise a delicate mechanism while others necessitate great power for their manipulation, and in others still, and these form the greater number, the closing members deteriorate very rapidly, whereby operation thereof is rendered extremely uncertain.

A problem has therefore arisen which consists in the following: to realise by simple, fool-proof means the opening and closing of the distribution orifices of the reservoirs or receptacles containing highly compressed fluids and only necessitating for their operation a minimum effort, so that it may finally be possible to use these apparatuses conveniently in all industries and more particularly in aviation for the instantaneous opening of the fabrics of parachutes.

A solution to this problem is afforded by the subject of the present invention, which provides a mechanism for controlling a needle valve for opening or closing the orifices through which the highly compressed fluid passes.

An object of the invention is to provide, with a small volume and a very reduced weight, a certain volume of fluid under high pressure, and to permit of using this volume of fluid conveniently by the manipulation of a needle valve functioning as simply as an ordinary tap.

According to the invention mechanism for controlling a needle valve for high-pressure fluids is provided which is characterised by a control mechanism acting on a movable hollow member containing a spring, the tension of which is exerted on a needle valve projecting from said movable member, the said needle valve acting both as a shut-off valve and as a safety valve, and the movable member having a seating which, when said movable member moves to open the needle valve, seals the chamber containing said movable member against escape of fluid to the control mechanism.

Various constructions of taps and valves have previously been proposed having a hollow member adapted to be moved by the operating mechanism of the tap or valve to cause the raising or lowering in relation to its seat of the actual valve member, which is pressed in the direction of the valve seat by a spring positioned in the hollow member; but mechanism for controlling a needle valve for high-pressure fluids in accordance with the present invention having a seating adapted to seal the chamber containing the movable member against escape of fluid to the control mechanism, has never previously been suggested.

In order that the invention may be more readily understood and carried into effect an embodiment thereof is illustrated in the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view of the assembled parts of the mechanism for controlling a needle valve placed in its closing position.

Figures 2 and 3 show respectively the mechanical member actuating a needle valve in its closing position and in its open position;

Figure 4 shows under the same conditions of illustration as Figure 1 the complete arrangement of the parts constituting the mechanism for controlling a needle valve in its opening position:

Figure 5 is a side view of the device actuating from the outside the mechanical member displacing the needle valve: and

Figure 6 is a plan view of the apparatus constituted by the device.

The form of mechanism for controlling a needle valve for highly compressed fluid is illustrated, in the non-limitative example given, for distributing a fluid

[*Price* 1/-]

under pressure inside sleeves disposed in the fabric or surface of a parachute for the purpose of bringing about in a very rapid and reliable manner the opening thereof at the moment of use.

In the drawing the cylindrical body 1 is adapted to be screwed hermetically on to the flask 2 containing the high-pressure fluid. The filling aperture 8*a* of this flask is closed by a plug 2*a* forming a needle valve. The plug 2*a* is furnished with the grooves 2*b* and the slot 2*c* required for its operation.

Inside this body 1 is displaced with slight friction a hollow movable member or box 3 forming a hollow piston closed by a plug 4 having on its upper part a seating or sealing surface 4*a*. Inside this box is disposed a spring 5 calibrated for a given pressure and bearing on the one hand on the lower part of the plug 4 and on the other hand on a collar 6 connected to a needle 7 closing when at rest the orifice 8 establishing communication between the body 1 and the flask 2.

The plug 4 is terminated at the top by a rod 9 which contacts with a cam 10 having the profile shown in Figures 2 and 3. This cam, which controls the needle valve 7, is enclosed in a socket 11 adapted to screw tightly on to the body 1. The cam 10 is mounted on a shaft 12 which carries a member 13 in the form of a disc, in which is formed a notch 14 and a lip 15. Carried by a rod 19 is an arm 16, having a hook 18 (Figure 5) adapted to coact with the lip 15, and a stud 17 adapted to engage in the notch 14. The rod 19 is pressed upwardly by a recoil spring 20 and is adapted to be drawn downwardly by the draw rod or the like 21.

A nipple 22 (Figures 1 and 4) connects the flask 2 to the member for the utilisation of the fluid under pressure by the operation of the needle valve 7.

One or more grooves 23 (Figs. 1 and 4) are provided on the periphery of the box 3 and on the aperture in the socket 11 for the rod 9.

When constituted in this manner the device for controlling the needle valve 7 operates in the following manner:

The flask 2 is filled with fluid under pressure through the orifice 8*a*. (The time when the flask is full may be determined from the weight of fluid introduced). When the flask is charged and closed, it is sufficient, in order to use the fluid under pressure contained therein, to exert a slight pull (so calculated that it may be produced by a child) on the draw rod 21 (Figure 5) as a result of which, the rod 19 is pulled in the downward direction (direction of the arrow 30), the stud 17 is withdrawn from the notch 14 and at the same time the hook 18 is first brought on to the lip 15 and the disc 13 is then displaced, this disc being connected with the shaft 12 and thus causing rotation of the cam 10, which will move to the position shown in Figure 3. At this moment, the needle valve 7 (Figure 4) is no longer supported by the tension of the spring 5, but it is only subjected to the force of the action of the pressure of the fluid contained in the flask 2. The needle valve 7 rises and the box 3 forming a piston bears with force by means of the seating or sealing surface 4*a* of the plug 4 on a coacting seating on the socket 11. The chamber containing the hollow member on box 3 thus becomes sealed against escape of fluid to the control mechanism and the whole of the fluid under pressure leaves through the nipple 22 connecting the air sleeves of the parachute to the apparatus. In this position, the cam 10 cannot return back to its original position owing to the lip 10*a* (Figure 3) abutting on the stop formed by the rod 9, so that the flask 2 remains open, whereby safety is afforded in the application to parachutes since the flask cannot close again.

Upon landing, the cam 10 is returned in the direction of the arrow 31 (Figure 3), which brings about the progressive closing of the orifice 8 by the descent of the needle valve. The latter already closes the orifice 8 (Figure 1) while the chamber 3 continues to descend for a few millimetres, whereby the needle valve is left free and rendered independent in the member supporting it. This arrangement permits of making this needle valve function in exactly the same manner as a safety valve.

In fact, if for any reason, such as abnormal heating of the flask 2, the volume and consequently also the pressure of the fluid should be increased the needle valve 7 would function as a relief or safety valve, as the spring 5 would yield under this excess pressure and the fluid would leave the flask 2 through the grooves 23 and escape to the outside owing to the lack of tightness of the parts controlling the needle 7: journals or bearings of the shaft 12. Unless the amount of fluid was excessive, the fluid would not cause the inflation of the parachute tubes connected to the nozzle or nipple 22.

It is further to be observed that owing to the particular form of the cam 10 it is possible by actuating it in the direction of the arrow 32 (Figure 2) to obtain a progressive discharge of fluid or to regulate the feed thereof. In this case, the part 13 is removable so that, by removal thereof, it is possible to displace

the cam 10 conveniently in the direction of its inclined surface without hindrance by the stud 17 and the hook 18.

The mechanism according to the invention constitutes a considerable improvement in the art by reason of the new industrial results obtained. However, the forms, dimensions and material employed may vary without changing the spirit of the invention hereinbefore described. Thus, for example, the mechanism may be used with advantage for inflating inner tubes of pneumatic tyres and for all similar purposes. In the same way, it is pointed out that the nipple 22 may be utilised for filling the flask 2 should the plug 2*a* be dispensed with.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Mechanism for controlling a needle valve for high-pressure fluids, characterised by a control mechanism acting on a movable hollow member containing a spring, the tension of which is exerted on a needle valve projecting from said movable member, the said needle valve acting both as a shut-off valve and as a safety valve, and the movable hollow member having a seating which, when said movable hollow member moves to open the needle valve, seals the chamber containing said movable hollow member against escape of fluid to the control mechanism.

2. Mechanism as in claim 1, comprising a cam acting on the upper part of the movable member resiliently connected to a needle valve, said cam being actuated directly by hand or through the intermediary of an arm carrying stop and driving members.

3. Mechanism as in claim 1, or claim 2, comprising a movable member constituted by a hollow piston, wherein is disposed a spring of regulatable tension acting on a needle valve projecting out of said piston, which is displaced in a fluid tight body disposed on the reservoir containing a fluid under pressure.

4. Mechanism for controlling a needle valve for high-pressure fluids, constructed, arranged and adapted to operate substantially as hereindescribed with reference to the accompanying drawings.

Dated this 28th day of April, 1937.

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Agents for the Applicant.

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Fig.1

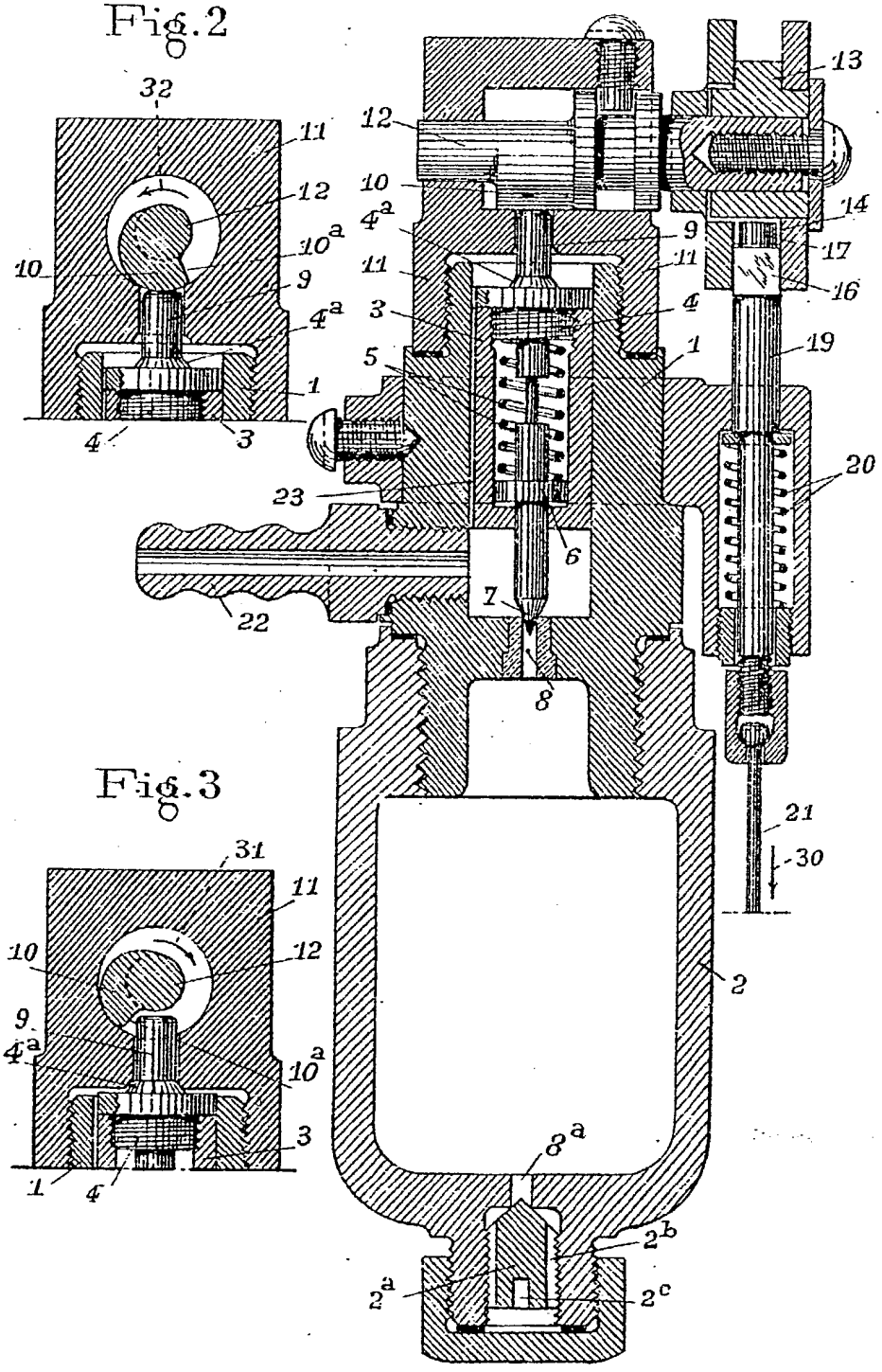


Fig.2

Fig.3

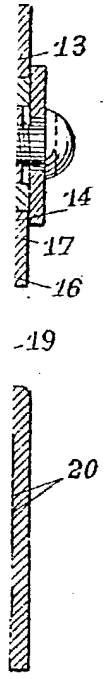
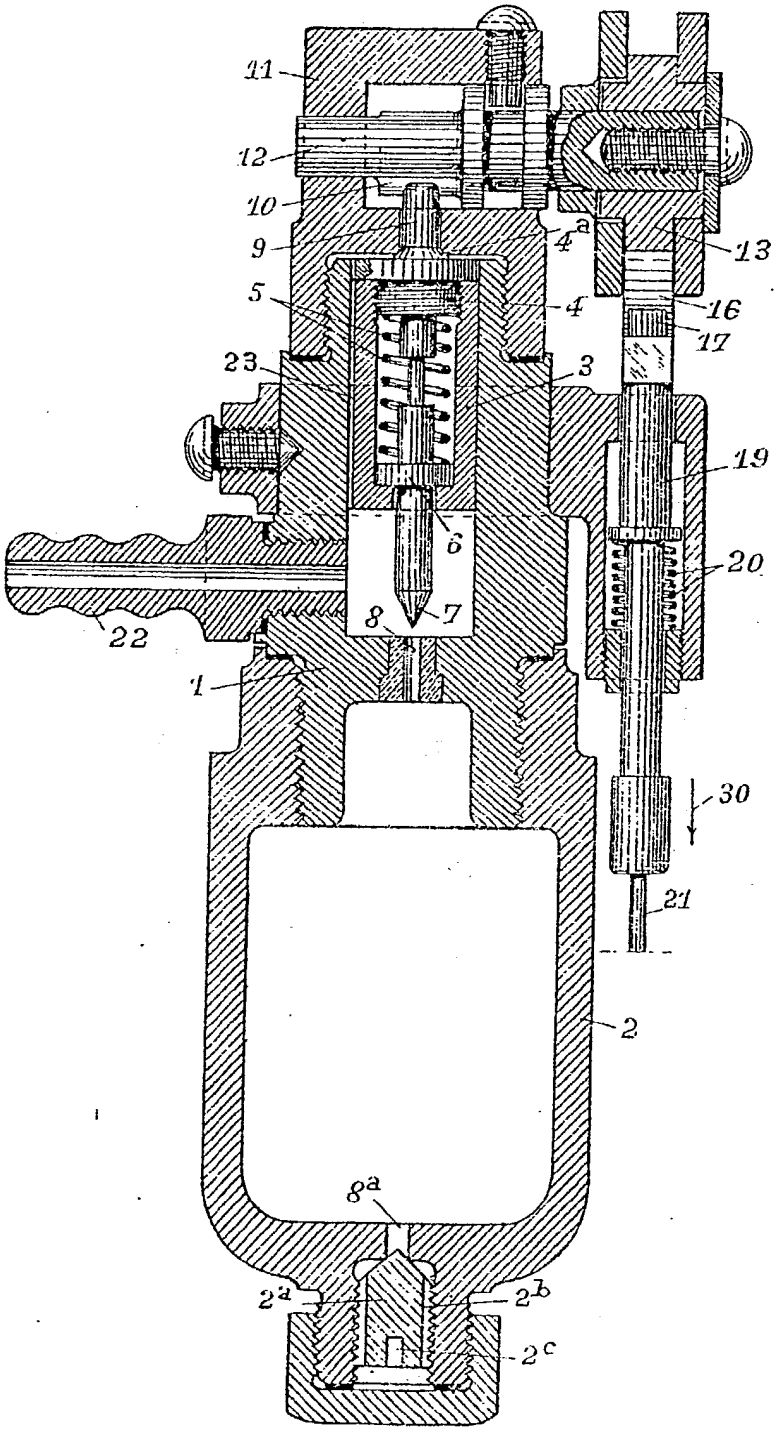


Fig.4



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475,327 COMPLETE SPECIFICATION

4 SHEETS

SHEET 1

SHEET 2

Fig.1

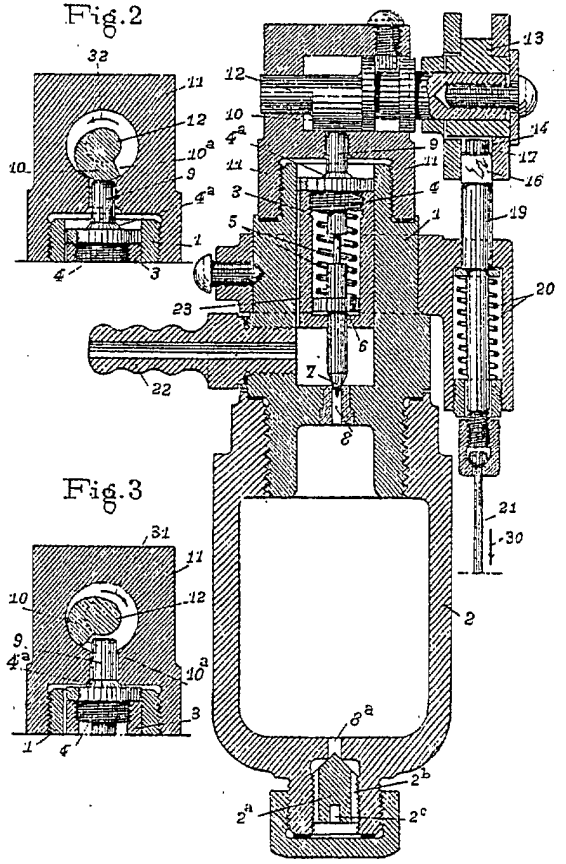
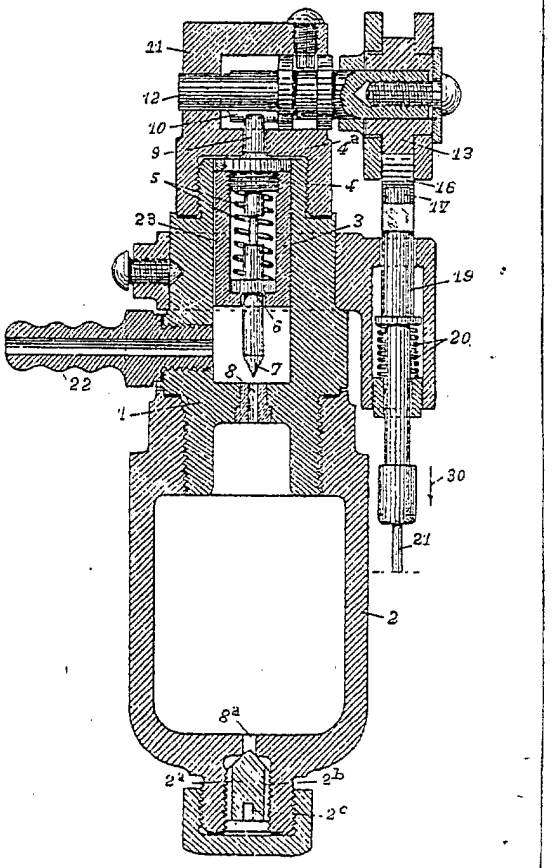


Fig.2

Fig.3

Fig.4



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[This Drawing is a reproduction of the Original on a reduced scale.]

Fig.5

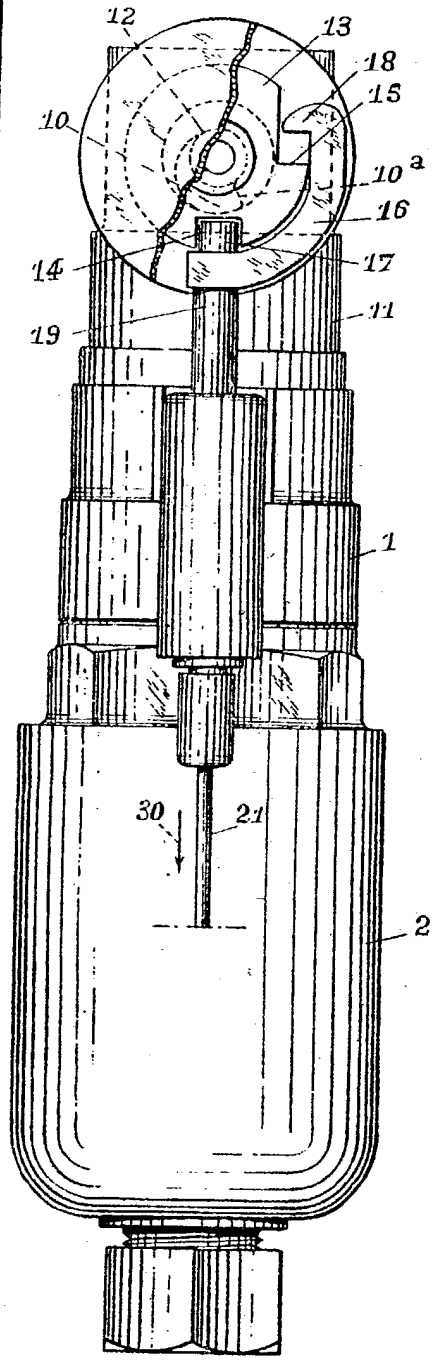
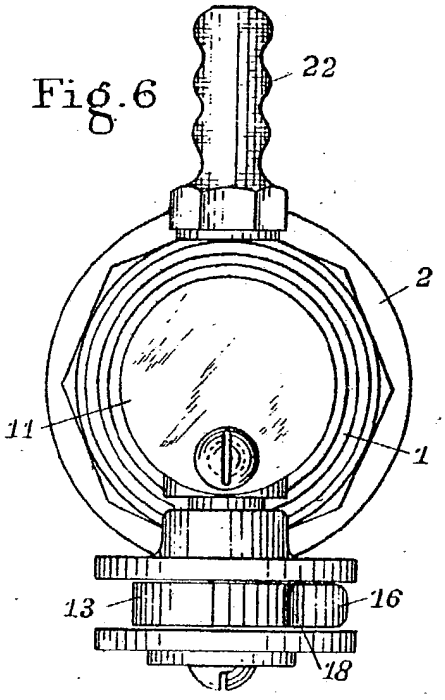


Fig.6



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